

Pure Mathematics P1 (AS & A-Level)

Topics: Quadratics: Notes

- Solution of equations (by taking common, by factorization, by completing square method and by quadratic formula).
- Simultaneous solution of equations (two linear equations, linear and quadratic equations and line and graph)
- Line is tangent to the curve (a line is tangent to the curve or the quadratic equation has equal roots, then discriminant $b^2 - 4ac = 0$ is equal to zero. In quadratic formula the part $b^2 - 4ac$ is called discriminant).
- If line does not meet the curve or quadratic equation has no real roots, then discriminant $b^2 - 4ac < 0$.
- If quadratic equation has two distinct roots, then discriminant $b^2 - 4ac > 0$.
- In completing square form $(x + a)^2 + b$, b is called the minimum point. If minimum point lies above x-axis then $b > 0$.
- $\frac{dy}{dx}$ at given point is called gradient of the curve (if $y = ax^n$ then $\frac{dy}{dx} = nax^{n-1}$)
- If two points $A(x_1, y_1)$ and $B(x_2, y_2)$ are given, then gradient is $\frac{y_2 - y_1}{x_2 - x_1}$.
- If two points $A(x_1, y_1)$ and $B(x_2, y_2)$ are given, then distance or length of line $AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$.
- If two points $A(x_1, y_1)$ and $B(x_2, y_2)$ are given, equation of line is $y = mx + c$
Or $y - y_1 = m(x - x_1)$
- Recognize and solve equations in 'x', which are quadratic in some functions of 'x'.
e.g. $x^4 - 5x^2 + 4 = 0$, $6x + \sqrt{x} - 1 = 0$ or $\tan^2 x = 1 + \tan x$.
- **Angle between line and tangent** is $\tan \theta = \frac{m_1 - m_2}{1 + m_1 m_2}$ or $\theta = \tan^{-1} \left(\frac{a}{b} \right)$
- **Stationary point of the curve** A stationary point of a function $f(x)$ is a point where the derivative of $f(x)$ is equal to 0. These points are called "stationary" because at these points the function is neither increasing nor decreasing. Graphically, this corresponds to points on the graph of $f(x)$ where the tangent to the curve is a horizontal line.
- **Behavior of curve**

